We claim:

1. A laser module for optical transmission systems, comprising:

a laser diode emitting light at an emitted output wavelength;

an optical resonator connected to said laser diode and having a reflective mirror surface and an adjustable effective optical path length and a photon density as a function of the effective optical path length;

an optical waveguide having a Bragg grating receiving the light from said laser diode; and

a stabilizer stabilizing the emitted output wavelength and having:

a measurement apparatus for measuring the photon density within said resonator,

an adjustment apparatus for adjusting the effective optical path length of said resonator, and

a control apparatus comparing the photon density at different effective optical path lengths of said resonator and producing control commands to said

adjustment apparatus in order to adjust the effective optical path length of said resonator to equal the emitted output wavelength to a desired wavelength.

2. The laser module according to claim 1, wherein said reflective mirror surface of said optical resonator is highly reflective.

3. The laser module according to claim 1, wherein said adjustment apparatus has a device for longitudinal movement of said optical waveguide.

4. The laser module according to claim 1, wherein said adjustment apparatus has a thermal regulating device for said laser diode.

5. The laser module according to claim 4, wherein said thermal regulating device heats said laser diode.

6. The laser module according to claim 4, wherein said thermal regulating device cools said laser diode.

7. The laser module according to claim 1, wherein said adjustment apparatus has a device for varying an operating current of said laser diode.

8. The laser module according to claim 1, wherein said measurement apparatus has a monitor diode disposed adjacent said highly reflective mirror surface of said optical resonator and detecting light output from said resonator by said mirror surface.

9. The laser module according to claim 1, wherein said measurement apparatus has a detector for detecting a voltage across said laser diode when a laser operating current is constant.

10. The laser module according to claim 1, wherein said control apparatus is part of a control loop regulating the emitted output wavelength of the laser module at the desired wavelength, with the photon density being measured iteratively and said control apparatus emitting a control command to said adjustment apparatus for adjusting the effective optical path length of said resonator based on a difference between two successive measurements.

11. The laser module according to claim 1, wherein said laser diode forms a Fabry-Perot semiconductor laser having a facet formed by said highly reflective mirror surface of said optical resonator.

12. The laser module according to claim 11, wherein said Fabry-Perot semiconductor laser has a front facet coated with an antireflective coating, said Fabry-Perot semiconductor laser sending light from said antireflective coating to said Bragg grating.

13. The laser module according to claim 1, wherein:

said Bragg grating has a central wavelength; and

said control apparatus controls said adjustment apparatus to approach the emitted output wavelength to the central wavelength of said Bragg grating.

14. The laser module according to claim 1, wherein:

said Bragg grating has a central wavelength; and

said control apparatus controls said adjustment apparatus to equal the emitted output wavelength to the central wavelength of said Bragg grating.

15. The laser diode according to claim 1, further comprising coupling optics coupling said laser diode to said Bragg grating.

16. The laser diode according to claim 15, wherein said coupling optics is a lens selected from the group consisting of a silicon lens, a spherical lens, an aspherical lens, and a graded index lens composed of a suitable optical material.

17. The laser module according to claim 15, wherein said coupling optics have an antireflection coating.

18. The laser module according to claim 16, wherein said coupling optics are slightly inclined.

19. The laser module according to claim 1, wherein said optical waveguide is a single-mode glass fiber.

20. The laser module according to claim 19, wherein:

said glass fiber has an end; and

said end of said glass fiber has an antireflection coating.

21. The laser module according to claim 19, wherein:

said glass fiber has an end; and

said end of said glass fiber is slightly inclined.

22. The laser module according to claim 1, wherein said Bragg grating is immediately adjacent said laser diode.

23. The laser module according to claim 1, wherein said control apparatus emits a control command to said adjustment apparatus to change the effective optical path length of said resonator by a predetermined fixed amount.

24. The laser module according to claims 1, wherein said control apparatus emits a control command to said adjustment apparatus based on an internal calculation to change the effective optical path length of said resonator by an amount depending on a comparison between different values of the photon density at different optical path lengths of said resonator.

25. A method for stabilizing an output wavelength of a laser module for optical transmission systems, which comprises:

a) providing a laser module including a laser diode emitting light at an emitted output wavelength, an optical resonator connected to the laser diode and having a reflective mirror surface and an adjustable effective optical path length and a photon density as a function of the effective optical path length, an optical waveguide having a Bragg grating receiving the light from the laser diode;

b) measuring the photon density within the resonator at a first effective optical path length of the resonator;

c) changing the effective optical path length of the resonator;

d) measuring the photon density within the resonator at a second effective optical path length of the resonator;

e) comparing the two measured photo densities;

f) adjusting the effective optical path length of the resonator based on the comparing step, with the effective optical path length of the resonator being changed depending on the comparing step; and

g) repeating steps b) to e) until the emitted output wavelength is equal to a desired wavelength.

26. The method according to claim 25, which further comprises repeating steps b) to f) regularly throughout a life of the laser module to calibrate the output wavelength.

27. The method according to claim 25, which further comprises repeating steps b) to e) until the emitted output wavelength equals a central wavelength of the Bragg grating.

28. The method according to claim 25, wherein the measuring of the photon density utilizes a monitor diode.

29. The method according to claim 25, wherein the measuring of the photon density utilizes a voltage dropped across the laser diode when a laser operating current is constant.

30. The method according to claim 25, wherein the effective optical path length of the resonator is adjusted by externally changing a temperature of the laser diode by at least one of varying an operating current of the laser diode and axially moving the optical waveguide.

31. The method according to claim 25, wherein the comparison of the measured photon densities is carried out by subtraction in step e).

32. The method according to claim 25, wherein the effective optical path length of the resonator is always changed by a predetermined value in step f).

33. The method according to claim 25, wherein the optical path length of the resonator is changed in step f) by an amount depending on the comparison of the measured photon densities in step e).

34. The method according to claim 25, which further comprises transmitting light in the resonator between the laser diode and the Bragg grating via coupling optics.